Assignment-31.1:

**Differences between HBASE and HDFS.**

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| **HBASE** | **HDFS** |
| HBase is an open source, distributed, versioned, column-oriented, No-SQL / Non-relational database management system that runs on the top of Hadoop. | HDFS - a distributed file system that distributes data across a cluster of machines taking care of redundancy. |
| HBase stores data as key/value pairs as in a column database. | HDFS stores data as flat files. |
| It gives you the ability to do random read/writes on your data. | HDFS doesn’t do random reads very well. |
| HBase provides a flexible data model**.** | HDFS does not provide a flexible data model. |
| The HDFS files are write once and read multiple times.HDFS does not support the option of random write or read. | Data is indexed by the row key and it has a very flexible data model and data is stored in a hashed table and access is available in a random manner |
| HDFS does not support fast individual record lookups | It  provides faster data lookup in the tables |

**List and explain the main components of HBASE.**

HBase is composed of three types of servers in a master slave type of architecture.

• **Region servers** serve data for reads and writes.

• **HBase Master** process handles the Region assignment, DDL (create, delete tables) operations

• **Zookeeper** maintains a live cluster state.

**HBase master:**

\* HBase HMaster is a lightweight process that assigns regions to region servers in the Hadoop cluster for load balancing. Responsibilities of HMaster –

\* Manages and Monitors the Hadoop Cluster

\* Performs Administration (Interface for creating, updating and deleting tables.)

\* Controlling the failover

\* DDL operations are handled by the HMaster

\* Assigns regions to the region servers and takes the help of Apache Zoo Keeper for this task.

**Region Server:**

\* These are the worker nodes which handle read, write, update, and delete requests from clients. Region Server process, runs on every node in the hadoop cluster. Region Server runs on HDFS DataNode and consists of the following components –

\* Block Cache – This is the read cache. Most frequently read data is stored in the read cache and whenever the block cache is full, recently used data is evicted.

\* MemStore- This is the write cache and stores new data that is not yet written to the disk. Every column family in a region has a MemStore.

\* Write Ahead Log (WAL) is a file that stores new data that is not persisted to permanent storage.

## Zookeeper:

\* Zookeeper is an open-source project that provides services like maintaining configuration information, naming, providing distributed synchronization, etc.

\* Zookeeper has ephemeral nodes representing different region servers. Master servers use these nodes to discover available servers.

\* In addition to availability, the nodes are also used to track server failures or network partitions.

\* Clients communicate with region servers via zookeeper.

\* In pseudo and standalone modes, HBase itself will take care of zookeeper.

\* HBase uses Zoo Keeper as a distributed coordination service to maintain server state in the cluster.

Various services that Zookeeper provides include –

a.) Establishing client communication with region servers.

b.) Tracking server failure and network partitions.

c.) Maintain Configuration Information

**Does Hbase support sql?**

\* Native Hbase does not support Sql like advance queries, to have Sql like queries you need phoenix on top of hbase.

\* HBase non-relational (NoSQL) database that runs on top of HDFS

\* It is an open source NoSQL database that provides real-time read/write access to those large datasets